

Green Duwamish Basin Technical Committee Meeting

Thursday, April 26, 1:30–3:30

Renton City Hall, Room 511
1055 S. Grady Way
Renton, WA

A G E N D A

Purpose:

Review and discuss FCZD CIP prioritization criteria, basin specific issues, project list, and project summary template

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| 1. Introductions | John Koon
1:30 – 1:40 |
| 2. Update – King County Flood Control Zone District (KCFCZD) formation | Sandy Kilroy
1:45 – 1:55 |
| 3. Basin Technical Committee Work Program, Timeline and general ground rules for April - June 2007 | Steve Bleifuhs
1:55 – 2:05 |
| 4. Criteria for KCFCZD Project Selection and Sequencing | Steve Bleifuhs
2:05 – 2:20 |
| 5. Draft KCFCZD Green Duwamish Basin project list <ul style="list-style-type: none">• Overview of flood hazard issues in basin• Discussion of identified project list for Basin• Questions and answers | Andy Levesque
2:20 – 3:10 |
| 6. Project summary sheets <ul style="list-style-type: none">• Due May 16, 2007 | Steve Bleifuhs
3:15 – 3:25 |
| 7. Next Steps and Wrap Up | Steve Bleifuhs
3:25 – 3:30 |

Green Duwamish Basin Technical Committee

Work Plan and Timeline

April – June 2007

Purpose:

Provide input and concur with the King County Flood Control Zone District CIP project list for the Basin.

Meeting Date	Purpose	Post Meeting Tasks/Outcomes
April 26, 2007	Review and discuss FCZD CIP prioritization criteria, basin specific issues, project list, and project summary template	Submit e-copies of project summary sheets Due May 16, 2007
May 24, 2007	Review and screen newly submitted project summary sheets, concur with sequenced CIP list	Prepare documents for June 14, 2007 BTC meeting
Tentatively June 14, 2007	Final concurrence on Green Duwamish CIP List	Present FCZD CIP list at June 22, 2007 Advisory Committee Meeting

6/13/2007

Green Duwamish BTC Timeline.doc

King County Flood Control Zone District

Criteria and Policies to Guide Project Selection and Sequencing

All projects contained within the Draft KC FCZD CIP list were identified within the adopted 2006 King County Flood Hazard Management Plan. King County uses severity, consequence, urgency, opportunity and readiness as general categories of criteria for selecting, prioritizing and sequencing projects actions to address flood and channel migration risks.

CRITERIA

Flood Risks – Severity (Policy G-2)

The natural processes of flooding and channel migration become risks when human development is located within flood hazard areas. The level of risk is evaluated on a case by case basis using the predicted likelihood of flooding and channel migration and the consequences that would result if no action is taken. Flood risks, and the resulting consequences that would result if no action is taken, are generally prioritized in the following order:

- a. Threats to public safety.
- b. Damage to public infrastructure.
- c. Impacts on the regional economy.
- d. Damage to private structures.

Consequence, Urgency, Opportunity (Policy PROJ-1: Prioritizing Flood Hazard Risk)

Listed in order of importance:

- a. The consequences that will result if no action is taken. Consequences should be prioritized as identified in Policy G-2.
- b. Urgency, where urgency is a measure of how quickly an action needs to be taken in order to prevent a risk from growing worse.
- c. Legal responsibility and authority, where legal responsibility and authority is a contractual relationship between King County and another person or agency to maintain a flood protection facility.
- d. Funding or partnership opportunities.

Readiness

All flood CIP recommendations contained within the adopted 2006 King County Flood Hazard Management Plan were additionally screened according to the following criteria pertinent to readiness and potential scheduling.

- a. Is the project identified within an adopted local hazard mitigation plan?
- b. Do property interests need to be acquired (fee simple or easement) for this project?
- c. If property interests need to be acquired, is the landowner willing to sell or sign a voluntary letter of agreement, expressing an interest in selling necessary property interests?
- d. What is the anticipated project start date (reflecting feasibility, opportunity, and readiness of project proposal)?

Note: The above criteria have been used for identified flood capital projects. These criteria will be used for any newly identified projects. This criteria may also be used as starting point to select project criteria for proposed District Sub-regional Opportunity Fund.

King County Flood Control Zone District

Green Duwamish River Project Preliminary Prioritization

4/23/2007

Preliminary Score	Project Name	Project Description	Total Cost	In Progress?	Time Sensitive Project?	Geographic overlap w/salmon plan project?
5,250	Boeing Levee Project	Stabilize the remaining riverbank slopes, by creating a midslope bench and reconstructing the lower embankment slopes, and rebuilding the levee toe.	\$ 9,085,000			Y
4,032	Briscoe Levee Project #4	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 1,135,000	Y	Y	
3,024	Nursing Home Levee Project	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 2,438,000			
2,352	Desimone Levee Project #3	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 650,000			
2,016	Narita Levee Project	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 1,913,000			
1,728	Riverside Estates Side Channel	Increase floodplain capacity by reconnecting an off-channel habitat to mainstem Lower Green. Breaches or removes Reddington Levee, replaces flood management function in setback location	\$ 2,387,000			Y
1512	Russell Road Project #2	Set back levee using current design and construction techniques.	\$ 9,085,000			Y
1440	Russell Road Project #1	Set road back from river and reconstruct lower bank using current design and construction methods.	\$ 9,085,000			Y
1,400	Horsehead Bend Project	Rehabilitate and stabilize an eroding riverbank.	\$ 1,448,000	Y	Y	Y
384/864	Pautzke and Fenster Levee Setback & Floodplain Reconnection	Relocates deteriorating levees in a manner that accommodates channel migration, aquatic edge, floodplain wetlands, riparian habitat	\$ 3,399,000	Y		Y
832	Myer's Golf Levee Project	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 4,967,000			
672	Desimone Levee Project #4	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 3,491,000			
576	Hamakami Levee Project	Setback existing levees, improves flood storage and conveyance, restores channel edge and riparian habitat conditions. Levee setback also protects agriculture	\$ 1,290,000			Y
504	Segale Levee Project #1	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 1,913,000			
480	Middle Green River Acquisitions	Purchase one at-risk homes and associated property in the middle Green River valley.	\$ 1,204,000			Y

King County Flood Control Zone District

Green Duwamish River Project Preliminary Prioritization

4/23/2007

Preliminary Score	Project Name	Project Description	Total Cost	In Progress?	Time Sensitive Project?	Geographic overlap w/salmon plan project?
432	Gilliam Creek Project	Replaces a 9-foot diameter iron flapgate on a concrete splash apron at a federal levee, with a fish passable structure, and rehabilitates Gilliam Creek	\$ 871,000			Y
432	Lower Mill Creek to Lower Mullen Slough Project	Increase floodplain capacity in a manner that increases access to lower valley tributaries. Rehabilitates steep, eroding levees and revetments , w/setbacks along Hawley and Frager Roads, restores channel edge, floodplain habitat.	\$ 5,002,000			Y
384	Gaco Western Project	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 1,913,000			Y
360	Duwamish Revetment Project	Bank stabilization and setback of existing revetment.	\$ 6,282,000			Y
360	Northeast Auburn Tributary	Improve floodplain capacity by restoring tributary access	\$ 897,000			Y
168/336	Briscoe Levee Projects 1-3, 5-8	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 14,970,000			
300	Segale #2 & #3 Project	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 4,782,000			Y
288	Kent Shops Levee Project	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 3,596,000			
252	Desimone Levee Project #1	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 860,000			Y
252	Desimone Levee Project #2	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 1,071,000			Y
168	Russell Road Project #3	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 472,000			Y
144	Fort Dent Levee Project	Sets back existing levees, improves flood storage and conveyance, restores channel edge and riparian habitat conditions	\$ 2,779,000			Y
144	Lone's Levee Project	Relocates deteriorating levee to edge of agricultural terrace, restores side-channel connection, channel migration, aquatic edge, floodplain wetlands, riparian habitat	\$ 1,571,000	Y		Y
112	Segale Levee Project #4	Rehabilitate levees to reduce the risk of flooding in the Lower Green River.	\$ 1,913,000			
108	Neely and Porter Levee Setback & Floodplain Reconnection	Relocates deteriorating levees to edge of agricultural area and roadway, restores side-channel connection, channel migration, aquatic edge, wetlands, riparian habitat	\$ 2,376,000			Y

King County Flood Control Zone District

Green Duwamish River Project Preliminary Prioritization

4/23/2007

Preliminary Score	Project Name	Project Description	Total Cost	In Progress?	Time Sensitive Project?	Geographic overlap w/salmon plan project?
80	Horath-Kaech Levee Setback Project	Relocates deteriorating levee to edge of agricultural area, restores side-channel connection, channel migration, aquatic edge, floodplain wetlands, riparian habitat	\$ 1,651,000			Y
80	Turley Levee Setback	Relocates deteriorating levee to edge of agricultural terrace, restores side-channel connection, channel migration, aquatic edge, floodplain wetlands, riparian habitat	\$ 1,179,000			Y
64	Gunter Levee Setback Project	Acquires off-channel floodplain and tributary wetlands, rehabilitates existing gunter Levee and Frager Road Levees with setback relocation, restores habitat	\$ 5,409,000			Y
60	78th Avenue South	Acquires degraded floodplain properties. Relocates roadway/revetment system landward. Restores river edge, stable bank, and floodplain habitat, riparian vegetation.	\$ 6,075,000			Y
30	I-405 Levee Project	Increase floodplain capacity by reconnecting an off-channel habitat to mainstem Lower Green. Breaches or sets back an existing levee, replaces flood management function in setback location. Reconnects abandoned river channel, rehabilitates channel edge and riparian, wetlands habitat	\$ 1,629,000			Y
8	Rosso Nursery Floodplain Capacity and Conveyance Project	Acquires degraded floodplain properties for the purpose of increasing floodplain capacity. Relocates revetment system landward. Restores river edge, stable bank, and floodplain habitat, riparian vegetation.	\$ 1,905,000			Y

Total: \$ 120,693,000

Green/Duwamish River Flood Hazard Management Project List

April 25, 2007

78th Avenue South

Location Information

Water Resource Inventory Area 9, Green River

River Mile 24.3 – 25.0, Left Bank

Council District 7

Jurisdiction: Unincorporated King County

Private lands to be acquired

No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$6,075,000

Problem Statement

Current conditions associated with the revetment along this reach include over-steepened and eroded banks which threaten the integrity of the road. Riparian area is also degraded.

What is at Risk

Public road is subject to erosion.

Proposed Project or Action

Acquire floodplain properties and set back the road and revetment landward of its current location using current design and construction practices.

Project Benefits

Reduce the risk of damage to the road, increase flood conveyance and improve in-stream and riparian habitat.

Coordination

Adjacent landowners

Other Information or Needs

Flood protection facility risk assessment

Boeing Levee Project

Location Information

Water Resource Inventory Area 9, Green River
River Mile 17.12-17.97, Right Bank
Council District 5
Jurisdiction: Kent
Public lands
No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$9,085,000

Problem Statement

This levee provides two feet of freeboard above the base flood elevation. Protected areas landward of the levee are four to six feet below the base flood elevation. The top of the levee throughout this entire segment has been set back about 150 feet from the edge of the channel; however, the full hydraulic benefits of the levee setback project will not be realized until the original, partially failing lower riverbank slope is removed and the lower bank is stabilized. In-stream and riparian habitat in this reach has also been degraded.

What Is at Risk

Risks identified in the 2006 *King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if the levee were to fail suddenly, resulting in deep fast flows in the vicinity of the levee failure;
- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;
- Damage to public infrastructure, including state highways and city streets in the lower Green River valley;
- Impact on regional economy resulting from widespread flooding of dense commercial area;
- Damage to private structures.

Proposed Project or Action

Stabilize the remaining riverbank slopes, by creating a midslope bench and reconstructing the lower embankment slopes, and rebuilding the levee toe.

Project Benefits

The existing, unstable levee slopes and toe will be rebuilt in a structurally stable manner. Degraded habitat conditions will be restored to a functional condition.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Coordination

Puget Sound Energy for relocation of power lines along the original top of bank.

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Briscoe Levee Projects 1-3, 5-8

Location Information

Water Resource Inventory Area 9, Green River
River Mile 15.60 to 17.11, Right Bank
Council District 5
Jurisdiction: Kent
City of Kent and Private lands
No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$14,970,000

Problem Statement

Unlike the Briscoe Levee Project 4 site, these segments of the Briscoe Levee have not revealed obvious signs of imminent slope failure. Lower bank slumping and general oversteepening of the riverward levee slopes predominate, however. Most levee slopes are over-steepened at approximately 1.6H:1V to 1.9H:1V, and therefore lack adequate structural stability to provide minimum factors of safety for several modes of slope failure. Robust toe buttress structures appear to be inadequate or absent. A portion of the Project 8 site exhibits unusual settlement and cracking of the paved asphalt trail, most likely due to the presence of large cottonwood roots within the levee prism. Overall, the Briscoe levee throughout exhibits a non-uniform cross section and varying levee crest elevations, raising questions about the quality and consistency of initial construction efforts. Levee failure here would flood most of the eastern portions of the lower Green River valley, including highly urbanized areas within the historical floodplain. The adjoining river segment lacks adequate instream and aquatic edge habitat structure, such as deep pools, large woody debris, and overhanging cover. The riparian buffer width is inadequate. The riverward slopes are largely dominated by invasive blackberries and reed canarygrass, which presently obscure the remaining slump block. Some shade trees have been planted on the landward levee slope along the margins of a parking lot and several office buildings, and a storm drainage system is present along the landward levee toe.

What Is at Risk

Risks identified in the 2006 *King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if levee were to fail suddenly, resulting in deep fast flows in the vicinity of the levee failure;
- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;

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- Damage to public infrastructure, including state highways and city streets in the lower Green River valley;
- Impact on regional economy resulting from widespread flooding of dense commercial area;
- Damage to private structures, including both homes and businesses.

Proposed Project or Action

Repair of this levee segment should be incorporated into a reach-length levee setback relocation with acquisition of sufficient easement area for reconstruction of levee slopes at a minimum 2.5H:1V slope angle. The levee toe should be reconstructed with the installation of large woody debris structures, excavation of a mid-slope bench/buttress, and revegetation with live willow layers and native riparian trees and shrubs. The upper levee slopes should also be stabilized.

Project Benefits

The existing, unstable levee will be rebuilt in a structurally stable manner. Local flood conveyance capacity will increase within this reach. Highly urbanized portions of the historical lower Green River floodplain will be secured against flood inundation that might otherwise occur due to catastrophic levee failure. The existing degraded habitat functions along this reach will also be improved by the setback and installation of large woody debris and native vegetation, consistent with Policy LG-1, and Conservation Hypotheses All-2 and All-6 of the salmon habitat recovery plan for Water Resource Inventory Area 9. In addition, long-term flood-fighting, levee repair and maintenance costs will be reduced or eliminated.

Coordination

Reconstruction of this levee segment will require a setback relocation of the raised levee structure landward from its existing location in order to secure stable angles of repose and meet minimum factors of safety for structural stability of the levee. This project will require easement widths in addition to those previously secured for this purpose. There are significant questions concerning the manner in which the required easements may be obtained. This project will require coordination with the members of the Green River Flood Control Zone District, FEMA, the City of Kent, the Washington Department of Fish and Wildlife, the Muckleshoot Indian Tribe and adjoining property owners. This levee reconstruction will be consistent with Policy LG-1 and Conservation Hypotheses All-2 and All-6 from the salmon habitat recovery plan for Water Resource Inventory Area 9.

Other Information or Needs

Easement acquisition could be problematic due to established land uses.

Project Area Map

A map of the project area may be found at:

<http://dnr.metrokc.gov/wlr/flood/fhmp/pdf/Briscoe.pdf>

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Briscoe Levee Project 4

Location Information

Water Resource Inventory Area 9, Green River
River Mile 16.45 to 16.55, Right Bank
Council District 5
Jurisdiction: Kent
City of Kent and Private lands
No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$1,135,000

Problem Statement

The levee slope is over-steepened at approximately 1.6H:1V to 1.9H:1V, and therefore lacks adequate structural stability to provide minimum factors of safety for several modes of slope failure. A toe buttress structure appears inadequate or absent. A 200- to 300-foot long portion of the riverward slope has developed or activated older tension cracks in the paved trail along the levee crest during flooding in early 2006, showing this as a critically damaged levee reach. Levee failure here would flood most of the eastern portions of the lower Green River valley, including highly urbanized areas within the historical floodplain. The adjoining river segment lacks adequate instream and aquatic edge habitat structure, such as deep pools, large woody debris, and overhanging cover. The riparian buffer width is inadequate. The riverward slopes are largely dominated by invasive blackberries and reed canarygrass, which presently obscure the remaining slump block. Some shade trees have been planted on the landward levee slope along the margins of a parking lot and several office buildings, and a storm drainage system is present along the landward levee toe.

What Is at Risk

Risks identified in the *2006 King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if levee were to fail suddenly, resulting in deep fast flows in the vicinity of the levee failure;
- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;
- Damage to public infrastructure, including state highways and city streets in the lower Green River valley;
- Impact on regional economy resulting from widespread flooding of dense commercial area;
- Damage to private structures, primarily businesses.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Proposed Project or Action

Repair of this levee segment should be incorporated into a reach-length levee setback relocation with acquisition of sufficient easement area for reconstruction of levee slopes at a minimum 2.5H:1V slope angle. The levee toe should be reconstructed with installation of large woody debris structures, excavation of a mid-slope bench/buttress, and revegetation with live willow layers and native riparian trees and shrubs. Upper levee slopes should also be stabilized.

Project Benefits

The existing, unstable levee will be rebuilt in a structurally stable manner. Local flood conveyance capacity will increase within this reach. Highly urbanized portions of the historical lower Green River floodplain will be secured against flood inundation that might otherwise occur due to catastrophic levee failure. The existing degraded habitat functions along this reach will also be improved by the setback and installation of large woody debris and native vegetation, consistent with Policy LG-1, and Conservation Hypotheses All-2 and All-6 of the salmon habitat recovery plan for Water Resource Inventory Area 9. In addition, long-term flood-fighting, levee repair and maintenance costs will be reduced or eliminated.

Coordination

Reconstruction of this levee segment will require a setback relocation of the raised levee structure landward from its existing location in order to secure stable angles of repose and meet minimum factors of safety for structural stability of the levee. This project will require easement widths in addition to those previously secured for this purpose. There are significant questions concerning the manner in which the required easements may be obtained. This project will require coordination with the members of the Green River Flood Control Zone District, FEMA, the City of Kent, the Washington Department of Fish and Wildlife, the Muckleshoot Indian Tribe and adjoining property owners. This levee reconstruction will be consistent with Policy LG-1 and Conservation Hypotheses All-2 and All-6 of the salmon habitat recovery plan for Water Resource Inventory Area 9.

Other Information or Needs

Easement acquisition could be problematic due to established land uses.

Project Area Map

A map of the project area may be found at:

<http://dnr.metrokc.gov/wlr/flood/fhmp/pdf/Briscoe4.pdf>

Desimone Levee Project #1

Location Information

Water Resource Inventory Area 9, Green River

River Mile 14.65 to 14.73, Right Bank

Council District 5

Jurisdiction: Tukwila

Private lands

No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$860,000

Problem Statement

This levee occupies a sharp, outer bend upstream from State Route 181. The levee slope is extremely over-steepened at approximately 1.4H:1V to 1.8H:1V. It lacks adequate structural stability to provide minimum factors of safety for several modes of slope failure. Levee failure would flood most of the eastern portions of the lower Green River valley. The levee crest is scarcely ten feet wide over most of this subreach. Previously, large toe rock had been placed to support the levee toe and to prevent undercutting erosion.

In addition to the problem with slope stability, this subreach lacks an adequate riparian buffer and instream habitat structure and complexity such as deep pools, large woody debris, and shade cover. Non-native shade trees are planted into the landward levee slope along the margins of a parking lot serving office buildings. Riverward slopes are largely dominated by invasive blackberries and reed canarygrass.

What Is at Risk

Risks identified in the 2006 *King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if levee were to fail suddenly, resulting in deep fast flows in the vicinity of the levee failure;
- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;
- Damage to public infrastructure, including state highways and city streets in the lower Green River valley;
- Impact on regional economy resulting from widespread flooding of dense commercial area;
- Damage to private structures, primarily businesses.

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Proposed Project or Action

Incorporate reconstruction of this segment into a reach-length levee setback with acquisition of sufficient easement area for reconstruction of riverward levee slopes at a minimum 2.5H:1V slope angles. Reconstruct the levee toe, install large woody debris structures, excavate a mid-slope bench/buttruss, and revegetate with live willow layers and native riparian trees and shrubs.

Project Benefits

The existing, unstable levee will be rebuilt in a structurally stable manner. Local flood conveyance capacity will increase within this reach. Highly urbanized portions of the historical lower Green River floodplain will be secured against flood inundation that might otherwise occur due to catastrophic levee failure. The existing degraded habitat functions along this reach will also be improved by the setback and installation of large woody debris and native vegetation, consistent with Policy LG-1 and Project LG-13, and Conservation Hypotheses All-2 and All-6 of the salmon habitat recovery plan for Water Resource Inventory Area 9. In addition, long-term flood-fighting, levee repair and maintenance costs will be reduced or eliminated.

Coordination

The levee slope reconstruction will require a structural setback relocation and easement widths in addition to those previously secured for this purpose. There are significant questions concerning the manner in which the required easements may be obtained. This project will require coordination with the members of the Green River Flood Control Zone District, FEMA, the City of Tukwila, the Washington Department of Fish and Wildlife, the Muckleshoot Indian Tribe and adjoining property owners. The levee reconstruction will require setback relocation of the raised levee structure landward from its existing location to achieve stable slope angles, and will also be consistent with Policy LG-1 and Project LG-13 recommendations for this reach from the salmon habitat recovery plan for Water Resource Inventory Area 9

Other Information or Needs

Easement acquisition could be problematic due to established land uses.

Project Area Map

A map of the project area may be found at:

<http://dnr.metrokc.gov/wlr/flood/fhmp/pdf/Desimone1.pdf>

Desimone Levee Project #2

Location Information

Water Resource Inventory Area 9, Green River

River Mile 14.73 to 14.83, Right Bank

Council District 5

Jurisdiction: Tukwila

Private lands

No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$1,071,000

Problem Statement

The levee slope is over-steepened at approximately 1.7H:1V to 2.0H:1V, and therefore lacks adequate structural stability to provide minimum factors of safety for rapid drawdown and intermediate stage modes of slope failure. The crest of this levee has previously experienced settlement in at least two locations, indicating potential subgrade problems. Levee failure would flood most of the eastern portions of the lower Green River valley, including highly urbanized areas. The toe buttress structure appears to be inadequate or absent. The river within this reach lacks adequate aquatic edge habitat structure such as large woody debris and overhanging native vegetation. The bank is vegetated mostly with invasive species, primarily reed canarygrass and blackberries, although a few immature big leaf maples are present. Non-native trees have been planted on the landward levee slope along the margins of a parking lot that abuts office buildings and warehouses adjacent to the levee.

What Is at Risk

Risks identified in the 2006 *King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;
- Damage to public infrastructure, including state highways and city streets in the lower Green River valley;
- Impact on regional economy resulting from widespread flooding of dense commercial area;
- Damage to private structures, primarily businesses.

Proposed Project or Action

Repairs to this levee segment should be incorporated into a reach-length levee setback with acquisition of sufficient easement area for reconstruction of the levee slopes at a minimum 2.5H:1V slope angle. The levee toe buttress should be reconstructed with

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installation of large woody debris structures, the excavation of a mid-slope bench/buttress revegetated with live willow layers and native riparian vegetation. The upper levee slopes should also be revegetated.

Project Benefits

The existing, unstable levee will be rebuilt in a structurally stable manner. Local flood conveyance capacity will be increased within this reach. Highly urbanized portions of the historical lower Green River floodplain will be secured against flooding inundation that might otherwise occur due to catastrophic levee failure. The existing degraded habitat functions along this reach will also be improved by the setback and installation of large woody debris and native vegetation, consistent with both Policy LG-1 and Project LG-13, and Conservation Hypotheses All-2 and All-6 of the salmon habitat recovery plan for Water Resource Inventory Area 9. In addition, long-term flood-fighting, levee repair and maintenance costs will be reduced or eliminated.

Coordination

The levee reconstruction will require acquisition of easement widths in addition to those previously secured for this purpose. There are significant questions concerning the manner in which the required easements may be obtained from affected property owners. This project will require coordination with the members of the Green River Flood Control Zone District, FEMA, the City of Tukwila, the Washington Department of Fish and Wildlife, the Muckleshoot Indian Tribe and adjoining property owners. The levee reconstruction will require a setback relocation of the raised levee structure landward from its existing location to achieve stable slope angles, and will also be consistent with Policy LG-1 and Project LG-13 recommendations for this reach from the salmon habitat recovery plan for Water Resource Inventory Area 9.

Other Information or Needs

Easement acquisition could be problematic due to established land uses.

Project Area Map

A map of the project area may be found at:

<http://dnr.metrokc.gov/wlr/flood/fhmp/pdf/Desimone2.pdf>

Desimone Levee Project #3

Location Information

Water Resource Inventory Area 9, Green River

River Mile 14.83 to 14.89, Right Bank

Council District 5

Jurisdiction: Tukwila

Private lands

No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$650,000

Problem Statement

The segment of the Desimone Levee that this project addresses has an over-steepened slope at approximately 1.6H:1V to 1.9H:1V and therefore lacks adequate structural stability to provide minimum factors of safety for several modes of slope failure. The toe buttress structure appears inadequate or absent. A 400- to 600-foot long portion of the riverward slope slumped up to 12 feet into the water during flooding in 1996, showing this as one of the most critical of all remaining damaged levee reaches throughout the lower Green River. Levee failure here would flood most of the eastern portions of the lower Green River valley, including highly urbanized areas within the historical floodplain. The adjoining river segment lacks adequate instream and aquatic edge habitat structure, such as deep pools, large woody debris, and overhanging cover. The riparian buffer width is inadequate. The riverward slopes are largely dominated by invasive blackberries and reed canarygrass, which presently obscure the remaining slump block. Non-native shade trees have been planted on the landward levee slope along the margins of a parking lot that serves several adjacent office buildings and warehouses.

What Is at Risk

Risks identified in the *2006 King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if levee were to fail suddenly, resulting in deep fast flows in the vicinity of the levee failure;
- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;
- Damage to public infrastructure, including state highways and city streets in the lower Green River valley;
- Impact on regional economy resulting from widespread flooding of dense commercial area;
- Damage to private structures, primarily businesses.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Proposed Project or Action

Repair of this levee segment should be incorporated into a reach-length levee setback relocation with acquisition of sufficient easement area for reconstruction of levee slopes at a minimum 2.5H:1V slope angle. The levee toe should be reconstructed using large woody debris structures, and a mid-slope bench/buttrass should be constructed. Upper levee slopes should then be stabilized.

Project Benefits

The existing, unstable levee will be rebuilt in a structurally stable manner. Local flood conveyance capacity will be increased within this reach. Highly urbanized portions of the historical lower Green River floodplain will be secured against flood inundation that might otherwise occur due to catastrophic levee failure. The existing degraded habitat functions along this reach will also be improved by the setback and installation of large woody debris and native vegetation, consistent with Policy LG-1 and Project LG-13, and with Conservation Hypotheses All-2 and All-6 of the salmon habitat recovery plan for Water Resource Inventory Area 9. In addition, long-term flood-fighting, levee repair and maintenance costs will be reduced or eliminated.

Coordination

This project will require easement widths in addition to those previously secured for this purpose. There are significant questions concerning the manner in which the required easements may be obtained. This project will require coordination with the members of the Green River Flood Control Zone District, FEMA, the City of Tukwila, the Washington Department of Fish and Wildlife, the Muckleshoot Indian Tribe and adjoining property owners. This levee reconstruction will require a setback relocation of the raised levee structure landward from its existing location to achieve stable slope angles. The project is consistent with Policy LG-1 and Project LG-13 from the salmon habitat recovery plan for Water Resource Inventory Area 9.

Other Information or Needs

Easement acquisition could be problematic due to established land uses.

Project Area Map

A map of the project area may be found at:

<http://dnr.metrokc.gov/wlr/flood/fhmp/pdf/Desimone3.pdf>

Desimone Levee Project # 4

Location Information

Water Resource Inventory Area 9, Green River
River Mile 15.01 to 15.34, Right Bank
Council District 5
Jurisdiction: Tukwila
Private lands
No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$3,491,000

Problem Statement

The area of this project is immediately downstream and adjacent to previous setback levee reconstruction and stabilization repairs completed in 2001 and 2003. The levee slope within this segment is over-steepened at approximately 1.6H:1V to 1.9H:1V, and therefore lacks adequate structural stability to provide minimum factors of safety for several modes of slope failure. The levee toe buttress structure appears to be inadequate. Several locations along the riverward slope have developed localized, minor slumping failures during flooding in 1995 and 1996, showing this as a levee reach of particular concern. Levee failure here would flood most of the eastern portions of the lower Green River valley. The river adjoining this levee segment lacks adequate aquatic edge habitat structure and complexity, such as deep pools, large woody debris and overhanging cover. The riverward slopes are largely dominated by invasive blackberries and reed canarygrass, which presently obscure the localized slump blocks. The riparian buffer width is also inadequate. Non-native shade trees have been planted on the landward levee slope along the margins of a railroad spur-line and parking lots serving adjacent warehouse buildings.

What Is at Risk

Risks identified in the *2006 King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if levee were to fail suddenly, resulting in deep fast flows in the vicinity of the levee failure;
- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;
- Damage to public infrastructure, including state highways and city streets in the lower Green River valley;
- Impact on regional economy resulting from widespread flooding of dense commercial area;
- Damage to private structures, primarily businesses.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Proposed Project or Action

Repair of this levee segment should be incorporated into a reach-length levee setback relocation with acquisition of sufficient easement area for reconstruction of the riverward levee slope at a minimum 2.5H:1V slope angle. This will require negotiations with local property owners concerning vacation of the railroad spur line serving these warehouses. This project should include reconstruction of the levee toe, installation of large woody debris structures, excavation of a mid-slope bench/buttress, revegetated with live willow layers and native riparian trees and shrubs, and stabilization of the upper bank.

Project Benefits

The existing, unstable levee will be rebuilt in a structurally stable manner. Local flood conveyance capacity will increase within this reach. Highly urbanized portions of the historical lower Green River floodplain will be secured against flood inundation that might otherwise occur due to catastrophic levee failure. The existing degraded habitat functions along this reach will also be improved by the setback and installation of large woody debris and native vegetation, consistent with Policy LG-1 and Project LG-13, and Conservation Hypotheses All-2 and All-6 of the salmon habitat recovery plan for Water Resource Inventory Area 9. In addition, long-term flood-fighting, levee repair and maintenance costs will be reduced or eliminated.

Coordination

Reconstruction of this levee segment will require acquisition of easement widths in addition to those previously secured for this purpose. There are significant questions concerning the manner in which the required easements may be obtained from affected property owners. This project will require coordination with the members of the Green River Flood Control Zone District, FEMA, the City of Tukwila, the Washington Department of Fish and Wildlife, the Muckleshoot Indian Tribe and adjoining property owners. This levee reconstruction will require a setback relocation of the raised levee structure landward from its existing location to achieve stable slope angles. The project will be consistent with Policy LG-1 and Project LG-13 recommendations for this reach from the salmon habitat recovery plan for Water Resource Inventory Area 9.

Other Information or Needs

Easement acquisition could be problematic due to established land uses, and especially regarding the parking lot and railroad spur-line. On the other hand, a portion of the existing parking lot and the railroad area itself would provide adequate room for the recommended setback.

Project Area Map

A map of the project area may be found at:

<http://dnr.metrokc.gov/wlr/flood/fhmp/pdf/Desimone4.pdf>

Duwamish Revetment Project

Location Information

Water Resource Inventory Area 9, Green River
River Mile 5.5-6.6, Both Banks
Council District 8
Jurisdiction: Tukwila and Seattle
Public and Private lands
No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$6,282,000

Problem Statement

Damaged and unstable revetments within this reach will allow property damage from bank erosion. Riparian habitat has also been degraded.

What is at Risk

Properties adjacent to project are subject to erosion.

Proposed Project or Action

Reconstruct revetments using current practices. To the extent possible, set revetments back to increase flood conveyance.

Project Benefits

Increased floodplain capacity, improved storage and conveyance and improve riparian and in-stream habitat conditions.

Coordination

Tukwila, Seattle

Other Information or Needs

Flood protection facility risk assessment

Fort Dent Levee Project

Location Information

Water Resource Inventory Area 9, Green River
River Mile 11.1 - 12.0, Right Bank
Council District 5
Jurisdiction: Tukwila
Public lands
No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$2,779,000

What is at Risk

Development landward of the Fort Dent levee is at risk from flooding should the levee fail catastrophically.

Problem Statement

Existing levee is steep, eroding, slumping and is at risk of failure. Riparian habitat is also degraded.

Proposed Project or Action

Set back existing levee and reconstruct using current practices.

Project Benefits

Reduced risk of levee failure, increased channel capacity and enhanced riparian and in-stream habitat conditions.

Coordination

Tukwila

Other Information or Needs

Flood protection facility risk assessment

Gaco Western Project

Location Information

Water Resource Inventory Area 9, Green River

River Mile 15.9-16.1, Left Bank

Council District 5

Jurisdiction: Unincorporated King County

Private lands

No Agricultural Production District, Farmland Preservation Program lands may be present.

Estimated Cost

\$1,913,000

Problem Statement

Existing levee is oversteepened and has erosion damage on face.

What is at Risk

Southcenter

Proposed Project or Action

Reconstruct levee to more stable configuration.

Project Benefits

Reduce risk of levee failure, increase channel capacity, improved storage and conveyance, enhanced riparian and floodplain habitat conditions.

Coordination

Local landowners

Other Information or Needs

Flood protection facility risk assessment

Gilliam Creek Project

Location Information

Water Resource Inventory Area 9, Green River
River Mile 12.65, Left Bank
Council District 5
Jurisdiction: Tukwila
Public lands
No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$871,000

Problem Statement

A paved trail and Christensen Road abut a locally steep riverbank largely covered with blackberries. Toe structure remains questionable. Portions of Christensen road are supported on the riverbank with gabion baskets. Local settling is present, as evidenced by separation of a jointed concrete outfall pipe. A 90" iron flapgate at the confluence of Gilliam Creek, near the downstream end, has previously stuck open due to entrainment of large woody debris from upstream. This outfall pipe is not screened to prevent debris accumulations, the flapgate impairs fish passage, and there is no backup closure device present. Local interior flooding occasionally needs to be pumped out of street manholes into the river during high water events.

What is at Risk

Paved recreational trail, Christensen Road, federal levee

Proposed Project or Action

Replace a 9-foot diameter iron flapgate on a concrete splash apron at the federal levee, with a fish passable structure, and rehabilitate the mouth of Gilliam Creek

Project Benefits

Maintains flood containment integrated with federal levee system. Restores tributary fish passage and rehabilitates tributary habitat.

Coordination

Tukwila

Other Information or Needs

Analysis of flood and erosion reduction benefits of project.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Gunter Levee Setback Project

Location Information

Water Resource Inventory Area 9, Green River
River Mile 16.0-17.4, Left Bank
Council District 5
Jurisdiction: Tukwila
Private lands
May include Farmland Preservation Program lands

Estimated Cost

\$5,409,000

What is at Risk

Commercial areas and development proposals within the City of Tukwila

Problem Statement

The formerly agricultural Gunter Levee has been raised to provide 2 feet of freeboard above the base flood, and is included within the Tukwila 205 federal levee project. Adjoining portions of the Frager Road Lowest Levee are proposed for incorporation into the federally authorized Tukwila 205 Levee also. These levees continue to protect croplands at present, but this area has been proposed for redevelopment. The levee is noticeably steeper throughout than the 2.5H:1V slope angles generally needed to achieve the recommended factor of safety against rapid drawdown failure in the type of soils present. Toe buttress structure is questionable throughout. Levee face slopes are covered with a thin layer of rip-rap armor. Slopes show localized scour and shallow slumping. Vegetation is dominated by invasive reed-canary grass and blackberries. No tree cover is present. A buffer area is lacking or inadequate. A year-round tributary stream has been entirely piped across the upper end of the site, and discharges to the river near RM 16.7. Soils in this area show evidence of piping and heaving. Reconstruction of this segment to stable slope angles should be a priority of any projects for development of the existing site areas.

Proposed Project or Action

Rehabilitate the existing Gunter Levee and nearby Frager Road Lowest Levees with setback relocation, restore habitat and increase flood storage and conveyance capacity. Stabilization of this levee segment should be incorporated into a reach-length levee setback relocation with acquisition of sufficient easement area for reconstruction of the levee slopes at a minimum 2.5H:1V slope angle. This action could be targeted to future development at this site location, and should definitely be included in any such action. A levee toe buttress should be constructed with large woody debris structures and excavation of a mid-slope bench/buttress, to be stabilized and re-vegetated with live willow layers and native riparian vegetation. The upper levee slopes should also be stabilized with native vegetation.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Project Benefits

Reduced risk of levee failure and associated flood hazard, improved flood conveyance and storage, improved riparian and in-stream habitat.

Coordination

Tukwila, Corps of Engineers, property owners

Other Information or Needs

Flood protection facility risk assessment

Hamakami Levee Project

Location Information

Water Resource Inventory Area 9, Green River

River Mile 35.8– 36.1, Right Bank

Council District 7

Jurisdiction: Unincorporated King County

Private lands

Includes Agricultural Production District and Farmland Preservation Program lands

Estimated Cost

\$1,290,000

Problem Statement

The Hamakami levee is currently located riverward of productive farmland, isolating a riparian wetland from the river and reducing flood conveyance in the existing channel.

What is at Risk

Agricultural land

Proposed Project or Action

Relocate deteriorating levee to edge of agricultural terrace, restore side-channel connection, channel migration, aquatic edge, floodplain wetlands, and riparian habitat.

Project Benefits

Protected agricultural lands, stabilized shorelines, enhanced riparian buffers and floodplain habitat

Coordination

Army Corps Ecosystem Restoration Program

Other Information or Needs

Analysis of flood and erosion reduction benefits of project.

Horath-Kaech Levee Setback Project

Location Information

Water Resource Inventory Area 9, Green River
River Mile 35.1 – 35.7, Right Bank
Council District 7
Jurisdiction: Unincorporated King County
Private lands
Includes Agricultural Production District and possibly Farmland Preservation Program lands

Estimated Cost

\$1,651,000

Problem Statement

The Green River is bordered by several older levees and revetments which truncate a set of formerly active meanders along the margins of several agricultural properties that occupy the adjacent floodplain terrace. Some dense native vegetation is locally present on both sides of several of these older facilities, which provide minimal if any flood containment. The bank is actively and rapidly eroding.

What is at Risk

Productive agricultural lands

Proposed Project or Action

Relocate deteriorating levee to edge of agricultural area, restore side-channel connection, channel migration, aquatic edge, floodplain wetlands, riparian habitat

Project Benefits

Protects agricultural lands, stabilizes shorelines, enhances riparian buffers and floodplain habitat

Coordination

U.S. Army Corps of Engineers Ecosystem Restoration Program

Other Information or Needs

Analysis of flood and erosion reduction benefits of project.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Horsehead Bend Project

Location Information

Water Resource Inventory Area 9, Green River
River Mile 25.3-27.6, Left Bank
Council District 7
Jurisdiction: Unincorporated King County
Private and Public Lands
Includes Farmland Preservation Program lands

Estimated Cost

\$1,448,000

Problem Statement

In this reach slopes are extremely unstable and prone to channel migration and related erosion and slumping failures. Entire clumps of trees have caved into the river near RM 25.8, and with them, a former access road along the previous top of bank. Near the Carpinito Farm buildings near the upstream end of this reach, at RM 27.5, the channel has moved over 150 feet to the west, in a rapidly advancing and active outer meander bend. Proposed location of a future trail along the bank in this reach will be problematic until the channel migration phenomena are adequately addressed.

What is at Risk

Productive agricultural lands; King County trail right-of-way

Proposed Project or Action

Relocate deteriorating levee and access roadway to edge of agricultural terrace to protect the King County trail corridor from bank erosion and channel migration, and to conserve productive agricultural soils. Evaluate a range of flood risk reduction strategies to protect productive Farmland Preservation Program agricultural soils. Stabilize channel migration areas along the margin of the trail corridor with instream large woody debris and engineered logjams, and restore habitat complexity along the toe of the riverbank and along the aquatic edge of the channel with additional large woody debris. Regrade steep, failing riverbanks to stable angles of repose and excavate midslope benches/butresses, and restore and stabilize mid-slope benches, riverbanks, and reconnected floodplain, side channel and wetland habitat areas with native riparian tree and shrub plantings.

Project Benefits

Protects Regional trail right of way from bank erosion and conserves productive agricultural soils. Stabilizes eroding river bend(s)

Coordination

King County Parks; King County Farm Program

Other Information or Needs

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Analysis of flood and erosion reduction benefits of project.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

I-405 Levee Project

Location Information

Water Resource Inventory Area 9, Green River
River Mile 12.6 – 12.7, Right Bank
Council District 5
Jurisdiction: Tukwila
Private and Public Lands
No Agricultural Production District of Farmland Preservation Program lands

Estimated Cost

\$1,629,000

What is at Risk

Commercial properties protected by the levee system.

Problem Statement

The downstream end of this reach includes levees built in connection with the relocation of the Green River during construction of I-405. A small relict portion of the original channel is present behind the levee together with two hotel properties. The levee here is steep, armored with riprap, includes rubble near its upstream end, eroding, and not functioning as needed to contain flood waters.

Proposed Project or Action

Breach or set back the steep, eroding levee, and increase flood storage and conveyance capacity. Re-connect the abandoned river channel to the existing mainstem as a side channel habitat area. Stabilize and rehabilitate the channel edge with large woody debris installations, and restore riparian and wetlands habitat areas with native tree and shrub plantings

Project Benefits

Rehabilitated and functioning levee along the Lower Green River

Coordination

Tukwila

Other Information or Needs

Analysis of flood and erosion reduction benefits of project.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Kent Shops Levee Project

Location Information

Water Resource Inventory Area 9, Green River

River Mile 20.46 to 20.80, Right Bank

Council District 5

Jurisdiction: Kent

Public lands

No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$3,596,000

Problem Statement

The levee here adjoins the City of Kent's municipal Riverview Golf Course. The levee crest is paved as part of the Green River Trail system. The slopes of this levee range from about 1.7H:1V to 1.9H:1V, and are therefore unstable with respect to rapid drawdown and intermediate flood stage modes of potential levee failure. Failure of the levee would result in widespread flooding throughout the eastern portions of the lower Green River valley including highly urbanized portions of the historical floodplain within the Cities of Kent and Renton. The landward levee slope along the golf course is gently graded, with some locations planted with Douglas fir and other native and non-native trees. This levee segment also lacks adequate riparian buffer width. The riverward embankment is steep and largely dominated by invasive blackberries and reed canarygrass. Smaller rip-rap is evident along the levee toe, but is also absent in some areas. The river along the levee toe lacks adequate instream aquatic edge habitat structure and complexity such as deep pools, large woody debris and overhanging cover.

What Is at Risk

Risks identified in the 2006 *King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if levee were to fail suddenly, resulting in deep fast flows in the vicinity of the levee failure;
- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;
- Damage to public infrastructure, including state highways and city streets in the lower Green River valley;
- Impact on regional economy resulting from widespread flooding of dense commercial area;
- Damage to private structures, including homes and businesses.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Proposed Project or Action

Repair of this levee segment should be incorporated into a reach-length levee setback with acquisition of sufficient easement area for reconstruction of the riverward levee slopes at a minimum 2.5H:1V slope angle. This project would include reconstruction of the levee toe, installation of large woody debris structures, excavation of a mid-slope bench and toe buttress revegetated with live willow layers and native riparian trees and shrubs, and stabilization of the upper bank.

Project Benefits

The existing, unstable levee will be rebuilt in a structurally stable manner. Local flood conveyance capacity will increase within this reach. Highly urbanized portions of the historical lower Green River floodplain will be secured against flood inundation that might otherwise occur due to catastrophic levee failure. In addition, the existing degraded habitat functions along this reach will be improved by the setback and installation of large woody debris and native vegetation, consistent with Conservation Hypotheses All-2 and All-6, and with Policy LG-1 of the salmon habitat recovery plan for Water Resource Inventory Area 9. In addition, long-term flood-fighting, levee repair and maintenance costs will be reduced or eliminated.

Coordination

Reconstruction of this levee segment will require easement widths in addition to those previously secured for this purpose. There are significant questions concerning the manner in which the required easements may be obtained. The necessary easement areas are located within improved portions of the City of Kent's golf course, and may impact playable tees, greens and fairways, installed lighting, irrigation systems, golf cart paths and other landscaping features. This project will require coordination with members of the Green River Flood Control Zone District, FEMA, the City of Kent, the Washington Department of Fish and Wildlife, and the Muckleshoot Indian Tribe. This levee reconstruction will require relocation of the raised levee structure landward from its existing location and installation of riparian plantings and large woody debris, consistent with Policy LG-1 from the salmon habitat recovery plan for Water Resource Inventory Area 9.

Other Information or Needs

Easement acquisition could be problematic due to existing golf course land use and associated infrastructure improvements, such as irrigation and lighting systems. On the other hand, the City of Kent currently owns both the golf course and the trail, and would benefit from stabilization of the trail itself.

Project Area Map

A map of the project area may be found at:

<http://dnr.metrokc.gov/wlr/flood/fhmp/pdf/Maps/Kent.pdf>

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Lone's Levee Project

Location Information

Water Resource Inventory Area 9, Green River

River Mile 38.0 – 38.2, Right Bank

Council District 7

Jurisdiction: Unincorporated King County

Private lands

Includes Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$1,571,000

What is at Risk

Agricultural lands

Problem Statement

The Green River is bordered by several older levees and revetments which truncate a set of formerly active meanders along the margins of several agricultural properties that occupy the adjacent floodplain terrace. Some dense native vegetation is locally present on both sides of several of these older facilities, which provide minimal if any flood containment. Shorelines within this reach are actively eroding and flood protection structures do not provide adequate floodwater containment.

Proposed Project or Action

Relocate deteriorating levee to edge of agricultural terrace, restore side-channel connection, channel migration, aquatic edge, floodplain wetlands, and riparian habitat.

Project Benefits

Protected agricultural lands, improved aquatic and floodplain habitat, increased floodplain capacity and conveyance.

Coordination

Other Information or Needs

Analysis of flood and erosion reduction benefits of project.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Lower Mill Creek to Lower Mullen Slough Project

Water Resource Inventory Area 9, Green River
River Mile 21.4 – 23.9, Both Banks
Council Districts 5 and 7
Jurisdiction: Unincorporated King County
Public and Private lands

Portions of the reach within unincorporated King County include APD and FPP lands bordering Frager Road.

Estimated Cost

\$5,002,000

Problem Statement

Levees and revetments within this reach are over-steepened, eroding, and deteriorating, and not providing adequate flood protection. Lower Mill Creek and Lower Mullen Slough are not functioning to provide sufficient floodplain capacity, storage, and conveyance during significant flood events.

What is at Risk

Agricultural lands; Frager Road, mixed residential/commercial land uses

Proposed Project or Action

Rehabilitate steep, eroding levees and revetments with set backs along Frager Road and Hawley Road. Restore channel edge habitat with reconstruction of the levee toe buttress, incorporating large woody debris. Flatten steep banks with road set back and excavation of a midslope bench/buttress, and improve flood storage and conveyance capacity. Improve tributary access at the mouth of Mullen Slough and the small tributary at Fishing Hole Park. Restore degraded riparian and floodplain habitat conditions with floodplain reconnection grading and plantings of native riparian, floodplain, and wetland species.

Project Benefits

Restores floodwater access to lower valley tributaries, rehabilitates steep, eroding levees and revetments, with facility setbacks along Hawley and Frager Roads, restores channel edge, floodplain habitat

Coordination

Property owners, King County Farmlands Program, DDES, City of Kent Engineering Department, City of Kent Parks Department, Muckleshoot Indian Tribes, WDFW, Corps of Engineers, NOAA Fisheries, USFW Service.

Other Information or Needs

Flood protection facility risk assessment; Analysis of flood and erosion benefits of project.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Middle Green Acquisition

Location Information

Water Resource Inventory Area 9, Green River
River Mile 38.20 to 38.78, Right Bank
Council District 7
Jurisdiction: Unincorporated King County
Public or Private lands
In Agricultural Production District, may affect Farmland Preservation Program lands

Estimated Cost

\$1,204,000

Problem Statement

Previous property owner attempts to address flooding and channel erosion risks in this reach have achieved no measurable success. Flooding and channel erosion conditions have also resulted in successful lawsuits between former owners of these properties. One home at this location occupies an active floodplain channel surface within the severe channel migration hazard zone. Access to the home is compromised by deep, fast-flowing water during floods. Geomorphic studies conducted in the reach by the U.S. Army Corps of Engineers have documented dynamic formation of a large log-jam complex which has temporarily arrested meander advance. Future flood-related changes in the reach have the clear potential to mobilize the jam, thereby reactivating channel advance and placing the home in immediate jeopardy. The site is immediately upstream of the mouth of Burns Creek, and adjoins the upstream terminus of the existing Lone's Levee, which is targeted for setback relocation on the downstream agricultural property. This home is at extreme risk, and the situation needs to be promptly addressed.

What Is at Risk

Risks identified in the *2006 King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if residents are caught unaware of flood conditions or attempt to enter or reenter flooded area;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate flooded homes;
- Damage to private structures from both flooding and erosion.

Proposed Project or Action

Purchase and remove the single-family home, remove site fills, and replant native riparian trees and shrubs. This project should be integrated with levee setback and natural area habitat restoration initiatives throughout the adjacent reaches, both upstream and downstream, and at the mouth of Burns Creek.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Project Benefits

This project will eliminate ongoing risks to public safety and the potential for major damage to this home. It will also lead to a number of significant habitat benefits, including restoration of large amounts of high quality instream and riparian habitat. It should be noted that this parcel is immediately downstream from the largest reach of unconstrained riverine habitat in the middle Green River, the Metzler-O'Grady Natural Area, and thus this project affords a rare opportunity to enlarge this existing reach of superb habitat. This project is consistent with nearby Projects MG-9 and MG-10 from the salmon habitat recovery plan for Water Resource Inventory Area 9, and is also described in the Middle Green River Blueprint.

Coordination

This project should be coordinated with other projects and programs in the adjoining reaches of the middle Green River. A portion of this acquisition may be considered a part of the U.S. Army Corps of Engineers Green/Duwamish Ecosystem Restoration Projects proposed Lone's Levee project (MG-9), and is a significant Salmon Habitat Recovery Board project entitled Middle Green River Acquisitions. The Burns Creek Project, which is both a U.S. Army Corps of Engineers Green/Duwamish Ecosystem Restoration Project (MG-10) and a project included in the salmon habitat recovery plan for Water Resource Inventory Area 9, would also be affected by this acquisition. This property includes a portion of Burns Creek just above the mouth on the Green River. This flood risk reduction acquisition and long-term site management plans would need to be coordinated with the agencies proposing these related projects. Coordination with the Trust for Public Lands may be appropriate to accomplish acquisition of this home. Coordination with affected property owners and long-term land managers will also be needed.

Other Information or Needs

The potential benefits of putting this land into public ownership, beyond meeting the flood risk reduction needs described above, needs to be explored. This property acquisition needs to be evaluated with respect to funding opportunities associated with the identified public benefits.

Project Area Map

A map of the project area may be found at:

<http://dnr.metrokc.gov/wlr/flood/fhmp/pdf/NC.pdf>

Myer's Golf Levee Project

Location Information

Water Resource Inventory Area 9, Green River

River Mile 21.45 to 21.92, Right Bank

Council District 5

Jurisdiction: Kent

Public lands

No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$4,967,000

Problem Statement

The levee here adjoins Kent's municipal Riverview Golf Course, from Meeker Street to the south terminus of Russell Road. The upstream end of this levee segment also adjoins a small apartment complex, and a golf driving range owned by the City of Kent. This subreach is immediately downstream of the Pipeline Levee setback conducted in 2001 and 2003. The levee crest is paved as part of the Green River Trail system. Levee slopes here range from about 1.4H:1V to 1.6H:1V, and are therefore unstable to provide minimum factors of safety for several modes of levee failure. Failure of the levee would result in widespread flooding throughout the eastern portions of the lower Green River valley. Previous levee failures near this location in 1965 did in fact flood the area, which is now highly developed with urban infrastructure and densely configured land uses. The landward levee embankment along the golf course is gently sloped, with some locations planted with non-native trees. The riverward embankment is very steep and is largely dominated by invasive blackberries and reed canarygrass. Smaller rip-rap is occasionally evident along the levee toe, but is also occasionally lacking. The riverward edge of the levee toe lacks adequate aquatic edge habitat structure, such as large woody debris. The levee also lacks adequate riparian buffer widths sufficient to support native riparian vegetation, especially trees.

What Is at Risk

Risks identified in the *2006 King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if levee were to fail suddenly, resulting in deep fast flows in the vicinity of the levee failure;
- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;
- Damage to public infrastructure, including state highways and city streets in the lower Green River valley;

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

- Impact on regional economy resulting from widespread flooding of dense commercial area;
- Damage to private structures, including homes and businesses.

Proposed Project or Action

This levee segment should be incorporated into a reach-length levee setback reconstruction project with acquisition of sufficient easement area for reconstruction of the riverward levee slopes at a minimum 2.5H:1V slope angle. This project should include reconstruction of the levee toe, installation of large woody debris structures, excavation of a mid-slope bench and toe buttress revegetated with live willow layers and native riparian trees and shrubs, and stabilization of the upper bank.

Project Benefits

The existing, unstable levee will be rebuilt in a structurally stable manner. Local flood conveyance capacity will increase within this reach. Highly urbanized portions of the historical lower Green River floodplain will be secured against flooding inundation that might otherwise occur due to catastrophic levee failure. The existing degraded habitat functions along this reach will also be improved by the levee setback and installation of large woody debris and native vegetation, consistent with Conservation Hypotheses All-2 and All-6, and with Policy LG-1 of the salmon habitat recovery plan for Water Resource Inventory Area 9. In addition, long-term flood-fighting, levee repair and maintenance costs will be reduced or eliminated.

Coordination

Reconstruction of this levee segment will require a setback relocation of the raised levee structure landward from its existing location in order to secure stable angles of repose and meet minimum factors of safety for structural stability of the levee. The levee reconstruction will require easement widths in addition to those previously secured for this purpose. There are significant questions concerning the manner in which the required easements may be obtained. The necessary easement areas are located within improved portions of the City of Kent's golf course and driving range, and may impact playable tees, greens and fairways, installed lighting, irrigation systems, golf cart paths and other landscaping features. Additional coordination will also be needed with the owners of the adjoining apartment complex. This levee reconstruction will require setback relocation of the raised levee structure landward from its existing location and riparian plantings and large woody debris placement, consistent with Policy LG-1 from the salmon habitat recovery plan for Water Resource Inventory Area 9.

Other Information or Needs

Easement acquisition could be problematic due to existing developed golf course land use and associated infrastructure improvements, such as irrigation and lighting systems. Other constraints may exist adjacent to the apartment buildings. Even if acquisition is possible within present constraints, there may be additional acquisition costs. On the other hand, the City of Kent currently owns both the golf course and the trail, and would benefit from stabilization of this segment of the Green River Trail.

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

Project Area Map

A map of the project area may be found at:

<http://dnr.metrokc.gov/wlr/flood/fhmp/pdf/Myers.pdf>

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Narita Levee Project

Location Information

Water Resource Inventory Area 9, Green River

River Mile 20.95 to 21.13, Right Bank

Council District 5

Jurisdiction: Kent

Public lands

No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$1,913,000

Problem Statement

The levee here adjoins the City of Kent's municipal Riverview Golf course. The levee crest is paved as part of the Green River Trail system. The levee slopes range from approximately 1.3H:1V to 1.6H:1V, and are therefore severely inadequate to provide minimum factors of safety for several modes of levee slope failure. Extensive settlement and cracking are visible for over 1,000 feet along the paved levee crest, indicating significant concern with slumping potential in this reach. Failure of the levee would result in widespread flooding throughout the eastern portions of the lower Green River valley. The landward levee surface along the golf course is gently sloped, with some locations planted with Douglas fir and other native and non-native trees. The riverward embankment is extremely steep and largely dominated by invasive blackberries and reed canarygrass. Smaller rip-rap is evident along some portions of the levee toe, but is also occasionally absent. Aquatic edge habitat lacks structural complexity, such as that provided by large woody debris, and the width of the riparian buffer is inadequate to support native riparian vegetation, especially trees.

What Is at Risk

Risks identified in the *2006 King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if levee were to fail suddenly, resulting in deep fast flows in the vicinity of the levee failure;
- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;
- Damage to public infrastructure, including state highways and city streets in the lower Green River valley;
- Impact on regional economy resulting from widespread flooding of dense commercial area;
- Damage to private structures, including homes and businesses.

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Proposed Project or Action

This levee segment should be incorporated into a reach-length levee setback with acquisition of sufficient easement area for reconstruction of the riverward levee slopes at a minimum 2.5H:1V slope angle. This segment is immediately downstream from previous setback levee reconstruction projects at the Narita Levee in 2001 and 2004. This project would include reconstruction of the levee toe, installation of large woody debris structures, excavation of a mid-slope bench and toe buttress revegetated with live willow layers and native riparian trees and shrubs, and stabilization of the upper bank.

Project Benefits

The existing, unstable levee will be rebuilt in a structurally stable manner. Local flood conveyance capacity will be increased within this reach. Highly urbanized portions of the historical lower Green River floodplain will be secured against flood inundation that might otherwise occur due to catastrophic levee failure. The existing degraded habitat functions along this reach will also be improved by the levee setback and installation of large woody debris and native vegetation, consistent with Conservation Hypotheses All-2 and All-6, and with Policy LG-1 of the salmon habitat recovery plan for Water Resource Inventory Area 9. In addition, long-term flood-fighting, levee repair and maintenance costs will be reduced or eliminated.

Coordination

This levee reconstruction will require a setback relocation of the raised levee structure landward from its existing location in order to secure stable angles of repose and meet minimum factors of safety for structural stability of the levee. This levee reconstruction will require acquisition of easement widths in addition to those previously secured for this purpose. There are significant questions concerning the manner in which the required easements may be obtained. The necessary easement areas are located within improved portions of the City of Kent's golf course, and may impact playable tees, greens and fairways, installed lighting, irrigation systems, golf cart paths and other landscaping features. This project will require coordination with the members of the Green River Flood Control Zone District, FEMA, the City of Kent, the Washington Department of Fish and Wildlife, and the Muckleshoot Indian Tribe. This levee reconstruction will require relocation of the raised levee structure landward from its existing location and installation of riparian plantings and large woody debris, consistent with Policy LG-1 from the salmon habitat recovery plan for Water Resource Inventory Area 9

Other Information or Needs

Easement acquisition could be problematic due to existing golf course land use and associated infrastructure improvements, such as irrigation and lighting systems. Even if acquisition is possible with present constraints, there may be additional acquisition costs. On the other hand, the City of Kent currently owns both the golf course and trail, and would benefit from stabilization of the trail itself.

Project Area Map

A map of the project area may be found at:

<http://dnr.metrokc.gov/wlr/flood/fhmp/pdf/Narita.pdf>

This project summary sheet contains planning level information and preliminary cost estimates; final cost estimates will be developed as more detailed project level information is generated. Rev. 6/13/2007

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Neely and Porter Levee Setback & Floodplain Reconnection Project

Location Information

Water Resource Inventory Area 9, Green River
River Mile 34.3 to 35.1, Left Bank
Council District 7

Jurisdiction: Unincorporated King County

Public and private lands

Porter Levee site is in the APD with non-conforming use; Neely Levee is located on two FPP properties.

Estimated Cost

\$2,376,000

Problem Statement

The entire site is subject to flooding on a nearly annual basis, with higher flow events extending to the SE Green Valley Road and seeping up through the gravel shoulder to flow across the asphalt near the Green Valley Meats Company. Upstream from the Porter property the Neely Levee extends along farm properties, downstream from the Neely Bridge, but does not tie into the Porter levee. The intervening bankline supports a dense grove of native deciduous tree cover on a sharp inner bend, with more immature trees and willows, interspersed with blackberries, forming a narrow band along the remains of the Neely Levee upstream. The river in this reach shows active channel migration, with the Neely levee acting as a training levee here. Nearly the entire “protected area” floods anyway, on a nearly annual basis. Toe buttress structure is questionable, overtopping and failure of the Porter Levee is a repeated phenomenon, and the Neely Levee does not provide flood containment, nor is it provided with a functional vegetative buffer.

What is at Risk

Degraded habitat on both Porter and Neely sites, with flood impacts to crop usage and potential channel avulsion a risk to the Neely site area.

Proposed Project or Action

Relocate deteriorating levees to the edge of the floodway within the adjoining agricultural areas at the Neely site, and to the Green Valley Road at the Porter site. Restore old side-channel connections and re-activate the former channel migration areas. Restore and stabilize the aquatic edge of the channel with large woody debris installations, reconnect and restore isolated floodplain wetlands, and plant all disturbed areas with native riparian and wetlands vegetation, as appropriate.

Project Benefits

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Rehabilitated flood protection structures, protected agricultural lands, reduced flooding of SE Green Valley Road; restored habitat.

Coordination

Property owners, King County Farmlands Program, DDES, WRIA 9, Corps of Engineers, NOAA Fisheries, USFW Service, Muckleshoot Indian Tribes, WDFW.

Other Information or Needs

Analysis of flood and erosion benefits of project.

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Northeast Auburn Creek Project

Location Information

Water Resource Inventory Area 9, Green River

River Mile 25.4 to 25.5, Left Bank

Council District 7

Jurisdiction: Unincorporated King County

Public and Private lands

Includes Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$897,000

Problem Statement

Northeast Auburn Creek drains to the Lower Green River through a large culvert with a flapgate. Though the land surface here does not appear to overtop at high Green River flows, no freeboard is present above the base flood elevation. Therefore the flapgate is not considered eligible for consideration as a closure device for floodplain mapping purposes. As juvenile salmonids have previously been found in this tributary, the flapgate may also impede fish passage.

What is at Risk

Agricultural soils; non-compliant flap gate limits fish passage

Proposed Project or Action

Replace non-compliant flood closure flapgate with fish-passable structure at the mouth of Northeast Auburn Creek and restore stream habitat with large woody debris and native tree and shrub plantings.

Project Benefits

Replaces non-compliant flood closure flapgate with fish-passable structure. Evaluates flood risk reduction strategies for productive agricultural soils

Coordination

King County Farm Program

Other Information or Needs

Analysis of flood and erosion reduction benefits of project.

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Nursing Home Levee Project

Location Information

Water Resource Inventory Area 9, Green River

River Mile 25.86 to 26.09, Right Bank

Council District 5

Jurisdiction: Kent

Public and Private lands

No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$2,438,000

Problem Statement

This levee segment is part of the federally authorized Horseshoe Bend Section 205 Levee Project. The levee here is oversteepened throughout, with riverbank slopes in the range of 1.4H:1V to 1.7H:1V, which are inadequate to provide minimum structural stability factors of safety for a number of slope failure modes. One location, at River Mile 25.95, has previously slumped due to the discharge of surface runoff over the slope and down the riverbank. Though temporary repairs were made at this site in 2001, permanent repairs and Endangered Species Act-mandated mitigation measures have not yet been constructed. Several City of Kent parcels and right-of-way for the paved Green River Trail are present in this reach. The landward levee slope angles vary through the reach, with some locations supporting varying levels of native tree cover. The riverward embankment is very steep and is largely dominated by invasive blackberries and reed canarygrass, but with varying amounts of young native maples and alders present in some locations. Smaller rip-rap is occasionally evident along the levee toe, but is also lacking in other locations. The stream aquatic edge habitat is extremely degraded due to lack of large woody debris and overhanging vegetative cover. The width of the riparian buffer is also inadequate.

What Is at Risk

Risks identified in the 2006 *King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if levee were to fail suddenly, resulting in deep fast flows in the vicinity of the levee failure;
- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;
- Damage to public infrastructure, including state highways and city streets in the lower Green River valley;
- Impact on regional economy resulting from widespread flooding of dense commercial area;

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- Damage to private structures, primarily businesses.

Proposed Project or Action

Repair of this levee segment should be incorporated into a reach-length levee setback with acquisition of sufficient easement area for reconstruction of the levee at a minimum 2.5H:1V riverward slope angle. Repairs should include reconstruction of the levee toe, installation of instream large woody debris structures, excavation of a mid-slope bench and toe buttress, and revegetation of the lower bank and bench with live willow layers and native trees and shrubs. Levee upper slopes should also be stabilized.

Project Benefits

The existing, unstable levee will be rebuilt in a structurally stable manner. Local flood conveyance capacity will be increased within this reach. Highly urbanized portions of the historical lower Green River floodplain will be secured against flood inundation that might otherwise occur due to catastrophic levee failure. In addition, the existing degraded habitat functions along this reach will be improved by the setback and installation of large woody debris and native vegetation, consistent with Conservation Hypotheses All-2 and All-6, and with Policy LG-1 of the salmon habitat recovery plan for Water Resource Inventory Area 9. In addition, long-term flood-fighting, levee repair and maintenance costs will be reduced or eliminated.

Coordination

Reconstruction of this levee will require acquisition of easement widths in addition to those previously secured for this purpose. There are significant questions concerning the manner in which the required easements may be obtained. The necessary easement areas are located within several City of Kent parcels and some private parcels along the Green River Trail. Levee reconstruction will also require relocation of the City of Kent recreational trail. This project will require coordination with the members of the Green River Flood Control Zone District, the U.S. Army Corps of Engineers, the City of Kent, the Washington Department of Fish and Wildlife, and the Muckleshoot Indian Tribe. This levee reconstruction will require a setback relocation of the raised levee structure landward from its existing location and riparian plantings and large woody debris placement, consistent with Policy LG-1 of the salmon habitat recovery plan for Water Resource Inventory Area 9.

Other Information or Needs

Easement acquisition could be problematic due to existing land use and associated infrastructure improvements, such as a surface water pumping station discharging to the river through the levee near the upstream end. Even if the acquisition is possible with present constraints, there may be additional acquisition costs. On the other hand, the City of Kent currently owns several adjoining parcels and the trail right-of-way and would benefit from stabilization of the trail itself.

Project Area Map

A map of the project area may be found at:

<http://dnr.metrokc.gov/wlr/flood/fhmp/pdf/Nursing.pdf>

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Pautzke and Fenster Levee Project & Floodplain Reconnection Project

Location Information

Water Resource Inventory Area 9, Green River

River Mile 31.8 – 32.6 Left Bank

Council District 7

Jurisdiction: Unincorporated King County; Auburn

Public lands

No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$3,399,000

Problem Statement

Levees in this reach are largely training levees, and do not provide two feet of freeboard. The Fenster and Pautzke Levees both line the downstream edges of well-developed meander bends. Both are constructed at very steep slope angles with rip-rap armor, with local erosion and slumping visible. Toe structure is questionable throughout, and the levees are overgrown with a combination of blackberries and a scattering of immature native riparian trees and shrubs. A large stand of cottonwoods, alders, willows, and maples is present on the downstream portions of the Pautzke meander, and smaller groves are present behind the lower half of the Fenster Levee. A small, isolated swale is present behind the Fenster Levee, crossing a former pasture that is now owned by Auburn for development as an open space park. A larger swale near RM 32.02 was recently re-connected to the river in connection with repairs to a small portion of the Levee. Much of the Pautzke site is overgrown with blackberries, and half of the Fenster site is a former pasture, so that a functional vegetated buffer is not present throughout the reach. The very upstream end of the Pautzke Levee merges with the railroad embankment of the BNSF Railway, which, though steep, is constructed with large rock and vegetated with moderately mature native deciduous trees. The upstream portion of the site has been left as a side-channel, with the mainstem river abandoning this alignment during a meander chute cutoff channel avulsion in 1995 and 1996. Active sediment bars and vegetated bars occupy the former channel cross section, which still carries flows during larger events.

What is at Risk

Future City of Auburn park site

Proposed Project or Action

Relocate the deteriorating levees to set back locations and re-establish old side-channel connections. Stabilize the riverbank against channel migration by reinforcing the aquatic edge of the channel with large woody debris installations. Regrade the steep levee slopes to flatter angles and construct midslope benches/butresses. Regrade and re-connect the floodplain with the mainstem river, and reconnect isolated floodplain wetlands. Restore

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the regraded riverbanks, wetlands, and reconnected floodplain areas with native riparian tree and shrub plantings.

Project Benefits

Increased floodplain capacity, conveyance, and flood containment capacity of two levees.

Coordination

Auburn

Other Information or Needs

Analysis of flood and erosion reduction benefits of project.

Riverside Estates Side Channel Project

Location Information

Water Resource Inventory Area 9, Green River

River Mile 28.7 – 28.9 Left Bank

Council District 7

Jurisdiction: Unincorporated King County; Auburn

Private and public lands

No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$2,387,000

Problem Statement

The Reddington Levee here follows an old road alignment and cuts off older meander scrolls, one of which has been developed as a trailer park within the mapped floodplain of the Green River. These older meanders are connected to the river with a poorly constructed culvert through the levee, fitted with a small flapgate. Flooding of the trailer park still occurs, when this system fails to properly close during flood events. Just upstream of these meanders, a newer culvert outfall with a flapgate and backup closure system have recently been constructed to serve new developments and a future regional stormwater system planned by Auburn. The lower end of the Reddington Levee is constructed at steep slope angles with rip-rap armor, and supports very little vegetation other than blackberries and canary grass.

What is at Risk

Mobile home park

Proposed Project or Action

Remove and reconstruct the Reddington Levee in a setback location adjacent to the mobile home park, along the landward edge of the old side-channel area. Reconnect the old side-channel habitat to the mainstem. Reduce the flooding of mobile homes due to the existing malfunctioning flapgate/culvert system, and install a new, robust flood closure system with a backup closure device. Stabilize the channel edge and restore aquatic habitat complexity with large woody debris installations, and revegetate both the new levee slopes and the former levee footprint area with native riparian trees and shrubs.

Project Benefits

Reduced or eliminated flooding in mobile home park, increased floodplain capacity, conveyance, rehabilitation of the Reddington Levee.

Coordination

Auburn

Other Information or Needs

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Analysis of flood and erosion reduction benefits of project.

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Rosso Nursery Floodplain Capacity and Conveyance Project

Location Information

Water Resource Inventory Area 9, Green River
River Mile 20.0 – 20.9 Left Bank
Council District 5
Jurisdiction: Unincorporated King County; Kent
Private lands
No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$1,905,000

What is at Risk

Portions of the City of Kent are at risk from levee failure on the opposite bank.

Problem Statement

Slopes here are locally over-steepened, with rubble deposits present in at least one location. Localized erosion and slumping are also evident.

Proposed Project or Action

Acquires degraded floodplain properties. Relocate revetment system landward. Restores river edge, stable bank, and floodplain habitat, riparian vegetation

Project Benefits

Increased floodplain capacity, which would reduce the risk to opposite bank development in the City of Kent.

Coordination

Kent

Other Information or Needs

Analysis of flood and erosion reduction benefits of project.

Russell Road Project # 1

Location Information

Water Resource Inventory Area 9, Green River
River Mile 17.97-19.40 Right Bank
Council District 5
Jurisdiction: Kent
Public lands
No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$9,085,000

Problem Statement

This river segment is severely confined almost throughout by the close proximity of Russell Road S to the top of bank. The sole exception is near RM 18.60, at Van Doren's Landing Park, where a paved trail runs along the levee crest in a setback alignment landward of a narrow floodplain. At three locations slope repairs have excavated the road shoulder to create mid-slope benches. A small amount of large woody debris and native vegetation were installed at these repair sites. Elsewhere throughout this reach the slopes are steep, the toe structure is questionable, the banks are heavily vegetated with blackberries and reed canary grass, and localized slumps and erosion are evident.

What Is at Risk

Risks identified in the 2006 *King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Damage to public infrastructure, (Russell Road)

Proposed Project or Action

Set road back from river and reconstruct lower bank using current design and construction methods.

Project Benefits

Reduce or eliminate damages to Russell Road, increase flood conveyance and storage, improve instream and riparian habitat. .

Coordination

City of Kent, Corps of Engineers (Proposed Ecosystem Restoration Project area).

Other Information or Needs

Analysis of flood and erosion reduction benefits of project

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Russell Road Project # 2

Location Information

Water Resource Inventory Area 9, Green River

River Mile 19.40-20.40, Right Bank

Council District 5

Jurisdiction: Kent

Public lands

No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$9,085,000

Problem Statement

The levee here is co-located with a paved City of Kent Trail, which incorporates a portion of the former Russell Road alignment that is now closed to vehicular access within Kent's Russell Wood Park. The downstream most portion of this levee is set back behind a grove of mature cottonwoods, but a gravel road and parking lot still intrude right up to the river bank. The upstream portions of this segment are over steepened, the toe structure is questionable, and localized erosion and slumping are present. The downstream portions of this levee system are in close proximity to residential buildings in the Lakes subdivision, and the river bank is characterized by extensive sediment deposits forming a low bench that drops off steeply at the edge of the channel. Overall, this lower portion of the levee system has not shown evidence of slumping or erosion, but sinkholes have developed along the crest of the levee prism. Recent repairs of these sinkholes have revealed that the levee is largely composed of unaltered native alluvium with poor structural characteristics. The vegetation throughout this segment is dominated by reed canary grass with blackberries and some scattered clumps of native trees and shrubs. A narrow strip of land owned by the Kent Parks Department extends along the full length of these facilities along the landward side. This has been identified in the United States Army Corps of Engineer's Ecosystem Recreation Program as a potential site for levee setback, floodplain, riparian and instream habitat restoration. The levee system appears to provide two feet of freeboard throughout. Protected areas are about four to six feet in elevation below the levee crest. (Green River, City of Kent)

What Is at Risk

Risks identified in the 2006 *King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if the levee were to fail suddenly, resulting in deep fast flows in the vicinity of the levee failure;
- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;

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- Damage to public infrastructure, city streets;
- Impact on regional economy resulting from widespread flooding of dense commercial area;
- Damage to private structures.

Proposed Project or Action

Set back levee using current design and construction techniques.

Project Benefits

Reduce the risk of levee failure; improve instream and riparian habitat.

Coordination

City of Kent

Other Information or Needs

Feasibility and technical analysis required.

Russell Road Project #3

Location Information

Water Resource Inventory Area 9, Green River
River Mile 20.42 to 20.46, Right Bank
Council District 5
Jurisdiction: Kent
Public lands
No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$472,000

Problem Statement

This levee segment consists of the raised embankment and trail immediately bordering a sharp curve where Russell Road merges with James Street in Kent, near where the Narita/Kent Shops Levee system adjoining the Riverview Golf Course joins the Green River Trail. The slopes of this levee were partially stabilized and revegetated in 1999. The riverward slope angles range from about 1.5H:1V to 1.9H:1V, and therefore still lack adequate structural stability to provide minimum factors of safety for several modes of slope failure. A partial toe buttress repair and over a dozen pieces of large woody debris were installed in this reach in 1999. Portions of the slope could not be repaired, however, due to limitations on equipment access posed by overhead power lines. The proximity of this flood protection facility to Russell Road has previously prevented levee setback to fully stable slope angles. The overall stability of the toe is also questionable because only portions of the toe were repaired, working from the top of the bank with a dragline. Failure of the levee would result in widespread flooding throughout the eastern portions of the lower Green River valley including highly urbanized portions of Kent and Renton. Because a low vegetated bench could not be established in the slope during the repair completed in 1999, the aquatic edge habitat remains inadequate. The riparian vegetation planted in 1999 has matured somewhat, but the areas that could not be accessed by equipment due to nearby overhead power lines were not adequately revegetated and have remained invaded by non-native vegetation, including blackberries and reed canarygrass.

What Is at Risk

Risks identified in the 2006 *King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if levee were to fail suddenly, resulting in deep fast flows in the vicinity of the levee failure;
- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;

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- Damage to public infrastructure, including state highways and city streets in the lower Green River valley;
- Impact on regional economy resulting from widespread flooding of dense commercial area;
- Damage to private structures, including homes and businesses.

Proposed Project or Action

Repairs of this flood protection facility should be incorporated into a reach-length levee setback with the acquisition of sufficient easement areas for full reconstruction of the riverward levee slopes at a minimum 2.5H:1V slope angles. Setback levee reconstruction in this location will require modification or relocation of the existing Russell Road/James Street intersection as well. Levee slope stabilization would include reconstruction of the levee toe buttress, installation of large woody debris structures, excavation of a mid-slope bench/buttress revegetated with live willow layers and native riparian trees and shrubs, and stabilization of the upper bank.

Project Benefits

The existing, unstable levee will be rebuilt in a structurally stable manner. Local flood conveyance capacity will be increased within this reach. Highly urbanized portions of the historical lower Green River floodplain will be secured against flood inundation that might otherwise occur due to catastrophic levee failure. In addition, the existing degraded habitat functions along this reach will be improved by the setback and installation of large woody debris and native vegetation, consistent with Conservation Hypotheses All-2 and All-6, and with Policy LG-1 of the salmon habitat recovery plan for Water Resource Inventory Area 9. In addition, long-term flood-fighting, levee repair and maintenance costs will be reduced or eliminated.

Coordination

This project will require a setback relocation of the raised levee structure landward from its existing location in order to secure stable angles of repose and meet minimum factors of safety for structural stability of the levee. Reconstruction of this levee segment will require easement widths in addition to those previously secured for this purpose. There are significant questions concerning the manner in which the required easements may be obtained. The necessary easement areas would include portions of the City of Kent's roadway at the intersection of Russell Road and James Street, and may impact portions of a small municipal park immediately across the street from the levee site. This project will require coordination with the members of the Green River Flood Control Zone District, FEMA, the City of Kent, the Washington Department of Fish and Wildlife and the Muckleshoot Indian Tribe. This levee reconstruction will require relocation of the raised levee structure landward from its existing location and the installation of riparian plantings and large woody debris placement, consistent with Policy LG-1 from the salmon habitat recovery plan for Water Resource Inventory Area 9.

Other Information or Needs

Easement acquisition could be problematic due to the proximity of the existing roadway. Even if acquisition is possible with present constraints, there may be additional easement

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acquisition costs. On the other hand, the City of Kent currently owns both the street rights-of-way and an adjacent park property on the landward side of the road right-of-way. Reconstruction of this sharp corner may also benefit traffic flow in the area.

Project Area Map

A map of the project area may be found at:

<http://dnr.metrokc.gov/wlr/flood/fhmp/pdf/Russell.pdf>

Segale Levee Project #1

Location Information

Water Resource Inventory Area 9, Green River

River Mile 15.02 to 15.20, Left Bank

Council District 5

Jurisdiction: Tukwila

Private Lands

No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$1,913,000

Problem Statement

This levee segment is part of the overall Tukwila 205 federally authorized levee system. The levee here is situated at the upstream end of a tight outer bend that extends downstream along the edge of South 180th Street. The levee abuts a parking lot and railroad spur-line adjacent to a bank building. Levee slope is extremely over-steepened at approximately 1.4H:1V to 1.8H:1V, and therefore lacks adequate structural stability to provide minimum factors of safety for several modes of slope failure. No toe buttress structure has ever been constructed in this subreach. Beaver lodge excavation into the lower embankment and localized slumping have been observed since 1990. Levee failure would flood most of the western portions of the lower Green River valley in the City of Tukwila, including most of Southcenter retail and commercial center. The river adjoining this levee segment lacks adequate aquatic edge habitat structure and complexity such as deep pools, large woody debris and overhanging cover. The riverward slopes are largely dominated by invasive blackberries and reed canarygrass. The riparian buffer is also inadequate. A limited number of non-native trees have been planted on the landward slopes along the margins of a parking lot serving an adjacent bank building.

What Is at Risk

Risks identified in the 2006 *King County Flood Hazard Management Plan* Policy G-2 that this project is intended to reduce or eliminate include:

- Risk to public safety if levee were to fail suddenly, resulting in deep fast flows in the vicinity of the levee failure;
- Risk to public safety if those driving or working in areas protected by the levee are caught unaware of flood conditions or attempt to enter or reenter flooded areas;
- Risk to public safety if fire and rescue personnel are called upon to aid those unable or unwilling to evacuate buildings;
- Damage to public infrastructure, including city streets in the lower Green River valley;
- Impact on regional economy resulting from widespread flooding of dense commercial area;
- Damage to private structures, primarily businesses.

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Proposed Project or Action

Repair of this levee should be incorporated into a reach-length levee setback relocation with acquisition of sufficient easement area for reconstruction of the riverward levee slope at a minimum 2.5H:1V slope angle. A levee toe buttress should be constructed that includes the installation of large woody debris structures and excavation of a mid-slope bench/buttress. The upper slopes should be stabilized.

Project Benefits

The existing, unstable levee will be rebuilt in a structurally stable manner. Local flood conveyance capacity will be increased within this reach. Highly urbanized portions of the historical lower Green River floodplain will be secured against flood inundation that might otherwise occur due to catastrophic levee failure. In addition, the existing degraded habitat functions along this reach will be improved by the levee setback and installation of large woody debris and native vegetation, consistent with Conservation Hypotheses All-2 and All-6 and with Policy LG-1 of the salmon habitat recovery plan for Water Resource Inventory Area 9. In addition, long-term flood-fighting, levee repair and maintenance costs will be reduced or eliminated.

Coordination

Major redevelopment of properties adjoining this site has been proposed by the property owner within the City of Tukwila. The levee reconstruction will require easement widths in addition to those previously secured for this purpose. There are significant questions concerning the manner in which the required easements may be obtained. This project will require coordination with the members of the Green River Flood Control Zone District, the U.S. Army Corps of Engineers, FEMA, the City of Tukwila, the Washington Department of Fish and Wildlife, the Muckleshoot Indian Tribe and the adjoining property owner. This levee reconstruction will require a setback relocation of the raised levee structure landward from its existing location and riparian plantings and large woody debris placement, consistent with Policy LG-1 from the salmon habitat recovery plan for Water Resource Inventory Area 9.

Other Information or Needs

Easement acquisition could be problematic due to established land uses. Even if acquisition is possible with present constraints, there may be additional acquisition costs. The existing property owner has resisted prior attempts at easement acquisition.

Project Area Map

A map of the project area may be found at:

<http://dnr.metrokc.gov/wlr/flood/fhmp/pdf/Segale1.pdf>

Segale Levee Project # 2 and #3

Location Information

Water Resource Inventory Area 9, Green River

River Mile 15.2 – 15.7, Left Bank

Council District 5

Jurisdiction: Unincorporated King County; Tukwila

Private Lands

No Agricultural Production District or Farmland Preservation Program lands

Estimated Cost

\$4,782,000

Problem Statement

Riverward slopes in this reach have generally been reconstructed at 2H:1V angles of repose during three previous repairs, with some oversteepening of rock toe buttress structures still present. These slopes remain slightly steeper than generally recommended for achieving factors of safety for rapid drawdown conditions, relative to the range of soil conditions likely present. Downstream portions were rebuilt by the Corps, and the face slope was armored with rip-rap, then covered with native soil and subjected to subsequent, natural deposits of flood-borne sediment. These slopes now support volunteer stands of native willows and other, immature, native deciduous species. Upstream portions were constructed by King County with large toe rock, imbedded large woody debris, and willow cuttings in live geogrid layers. Localized deepening of the riverbed at the channel margins dislocated portions of the toe rock in this area, and the damaged areas were then rebuilt with additional toe rock, anchored large woody debris flow deflectors, and new plantings of a variety of native riparian species. The landward levee toe has been rebuilt with the same buried toe drain as in the adjoining reach downstream, supplemented with a raised rock filter berm, and penetrated with a series of groundwater relief wells connected by a manifold and pumped to the river from a large collection manhole. These measures were taken to address extreme seepage, piping, foundation liquefaction, sand boils, and hydrostatic uplift pressures present in this area during several previous flood events. General filling of adjacent grades to further address these conditions has been undertaken by the landowner. The levee provides two feet of freeboard throughout.

What is at Risk

Commercial properties in the Southcenter area

Proposed Project or Action

Future reconstruction of this levee should be incorporated into a reach-length levee setback relocation with acquisition of sufficient easement area for reconstruction of the riverward levee slope at a 2.25H:1V slope angle. This action should be targeted to future redevelopment at this site location. The levee toe buttress should be reconstructed to include the installation of large woody debris structures and excavation of a mid-slope

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bench/buttness. The upper slopes should be stabilized with native vegetation. A landward toe buttress structure and seepage drain should be included in this future work.

Project Benefits

Reduced risk of levee failure, improve in-stream and riparian habitat.

Coordination

Tukwila

Other Information or Needs

Flood protection facility risk assessment

Turley Levee Setback Project

Location Information

Water Resource Inventory Area 9, Green River
River Mile 37.2 – 37.5, Right Bank
Council District 7
Jurisdiction: Unincorporated King County;
Private Lands
Includes Agricultural Production District and possibly or Farmland Preservation Program lands

Estimated Cost

\$1,179,000

Problem Statement

The Green River is bordered by several older levees and revetments which truncate a set of formerly active meanders along the margins of several agricultural properties that occupy the adjacent floodplain terrace. Some dense native vegetation is locally present on both sides of several of these older facilities, which provide minimal if any flood containment.

What is at Risk

Agricultural lands

Proposed Project or Action

Relocate deteriorating levee to edge of agricultural terrace, restore side-channel connection, channel migration, aquatic edge, floodplain wetlands, and riparian habitat.

Project Benefits

Functioning levees to protect valuable agricultural soils

Coordination

Other Information or Needs

Analysis of flood and erosion reduction benefits of project.

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**King County Flood Control Zone District
Project Summary Sheet**

GENERAL INFORMATION

- 1. Project Name:**
- 2. Project Proponent** (Name and Agency):
- 3. Basin/Watershed:**
- 4. Project Type:** check all that apply. See Criteria/Policy Handout for additional project type description.
☐ Proposed supplement to an existing project, identified as part of the Draft KC FCZD CIP list
☐ Newly identified major river flood CIP, not currently on the Draft KC FCZD CIP list
☐ Sub-regional project proposal, not currently on the draft KC FCZD CIP list,
- 5. Total Estimated Project Cost (all phases):** \$
- 6. Proposed Local Share** (if sub-regional project). Provide other actual local share if known or proposed, if not known:
☐ \$ _____
☐ \$ 0

LOCATION INFORMATION

- 7. Downstream River Mile # to Upstream RM #:**
- 8. Right bank, Left bank, or Both banks:**
- 9. Jurisdiction(s):**
- 10. Public or Private lands:**
- 11. Agriculture Production District or Farmland Preservation Program lands: yes/no/do not know**

PROJECT INFORMATION

- 12. What's At Risk:**
- 13. Problem Statement:**
- 14. Proposed Project or Action:**

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**King County Flood Control Zone District
Project Summary Sheet**

15. Project Benefits:

16. Coordination Needs:

17. Other Information or Needs:

PROJECT PROPOSAL CRITERIA AND POLICY BASIS (See policy/criteria handout for expanded policy text and criteria, used to generate draft KC FCZD CIP lists)

18. Policy G-2 Flood Risks: please check all that apply, as to be addressed by the proposed project and include a brief description of the risk.

- ☐ Threats to public safety:
- ☐ Damage to public infrastructure:
- ☐ Impacts on the regional economy:
- ☐ Damage to private structures:

19. Policy PROJ-1 Prioritizing Flood Risks: please check all that apply, associated with proposed project and include a brief description of the risk.

- ☐ The consequences that will result if no action is taken. Consequences should be prioritized as identified in Policy G-2:
- ☐ Urgency, where urgency is a measure of how quickly an action needs to be taken in order to prevent a risk from growing worse:
- ☐ Legal responsibility and authority, where legal responsibility and authority is a contractual relationship between King County and another person or agency to maintain a flood protection facility:
- ☐ Funding or partnership opportunities:

20. Anticipated Project Start Date (to reflect feasibility, opportunity, and ‘ripeness’ of project proposal)

- ☐ 0-2 years
- ☐ 3-6 years
- ☐ 6+ years

21. Is the project identified within an adopted local hazard mitigation plan?

- ☐ Yes
- ☐ No

22. Do property interests need to be acquired (fee simple or easement) for this project?

- ☐ Yes
- ☐ No

23. If property interests need to be acquired, is the landowner willing to sell or sign a voluntary letter of agreement, expressing an interest in selling necessary property interests?

- ☐ Yes
- ☐ No

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